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SUMMARY

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THE METHODS OF INTENSIFYING THE PROCESSES OF DRYING CHEMICAL PRODUCTS, FOODSTUFFS AND CONSTRUCTION MATERIALS

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THE METHODS OF INTENSIFYING THE PROCESSES OF DRYING CHEMICAL PRODUCTS, FOODSTUFFS AND CONSTRUCTION MATERIALS

by

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S U M M A R Y

The process of drying damp materials is the most widespread technological process employed in the various branches of industry. In the USSR, about 18% of all extracted fuel is expended on drying purposes. Intensification of the drying process and simultaneous reduction in the fuel and electric power consumption per 1 kg of evaporated moisture are tasks of prime national economic importance allowing a considerable saving of fuel.

At the same time drying can be described as a technological process which involves changes in the structural and mechanical, physical and chemical and biological properties of the material being dried. These changes depend on the mechanism of moisture and heat transfer inside the damp material and on the kind and energy of bond between the moisture and material. On the basis of the laws of diffusion and thermodiffusion of moisture in capillary porous bodies and by changing the drying conditions by interrupted irradiation of the material with infrared rays methods have been developed to control the mechanism of moisture transfer and, hence, methods for affecting the technological quality of the material being dried.

The phenomenon of moisture thermodiffusion in capillary porous bodies discovered in the Soviet Union in 1934 makes it possible to regulate the migration of liquefied and vaporous moisture in the material during the drying process. The theory of heat and moisture transfer was utilised at the Power Institute to design a grain drier with a capacity of 50 tons per hour and with good heat and power characteristics. The drier increases the germinating power of grain by 15-20% stimulating at the same time more rapid sprouting.

Methods have been evolved for drying vegetables and a number of other foodstuffs which increase the productivity and reduce the duration of the drying process and the consumption of heat improving simultaneously their technological properties (vitamins and other water-soluble substances are preserved).

The regularities observed in the non-stationary fields of temperature and moisture content of the material being dried were used to obtain a ratio between the criterion of crack formation in building materials and the drying conditions. This makes it possible to find the optimal conditions for drying building materials (see Fig. 1).

Drying of refractory building materials by the pressure drop method increases the strength of ready articles 7 times and improves their thermoinsulation properties.

The theoretical regularities of heat and moisture exchange helped to develop methods of a combined drying of chemical and light industry materials which reduce the duration of drying 10 to 100 times and considerably cut down the consumption heat and electric power (see Table 2).

One ~~of~~ the promising method for drying colloidal materials of the chemical industry is drying them together with capillary porous bodies (accompanying materials) where use is made of the regularities of contact moisture exchange (migration of moisture from the colloidal to the capillary porous bodies).

The best technological properties of dried foodstuffs (meat, fish, vegetables, fruit) are ensured by the sublimation drying method (drying in a frozen state in a vacuum). When brought in contact with water these materials regain their original properties (size, colour, smell and taste). The production data on meat and fish drying are illustrated in Table 3. Today, drying of damp materials is not only a thermoelectric process for the removal of moisture but a thermal process as well for processing materials with a view to obtaining the required structural and mechanical, physical and chemical and biological properties of dried articles and products.

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